

Notes on South Indian Hepaticae—1¹

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(With seventeen text-figures)

INTRODUCTION

The bryological flora of south India, a territory luxuriant in liverworts both in frequency and variety, has not received adequate attention. Stray references to some liverworts from this area occur in some publications (reviewed by Pandé & Bharadwaj 1952; Udar 1975).

The leafy genera belonging to acrogynous Jungermanniales, which form the bulk of the hepatic vegetation of south India, have not been studied much. The present paper gives an illustrated taxonomic account of the genera *Trichocolea* and *Notoscyphus*. It is interesting that both these taxa are also commonly found in the eastern Himalayas.

DESCRIPTIONS

1. ***Trichocolea tomentella*** (Ehrh.) Dumort., Corr. Nees, Naturg. Eur. Leberm. 3:105 (1838). (Figs 1-8).

**Jungermannia tomentella* Ehrhart, Beitrage zur Naturkunde, 2:150. (1788).

Trichocolea tomentella Dumort., Comment. Bot. 113. (1822).

Trichocolea tomentella Dumort., Syllog. Jungerm. 67. (1831).

Trichocolea tomentella Dumort., op. cit. p. 99.

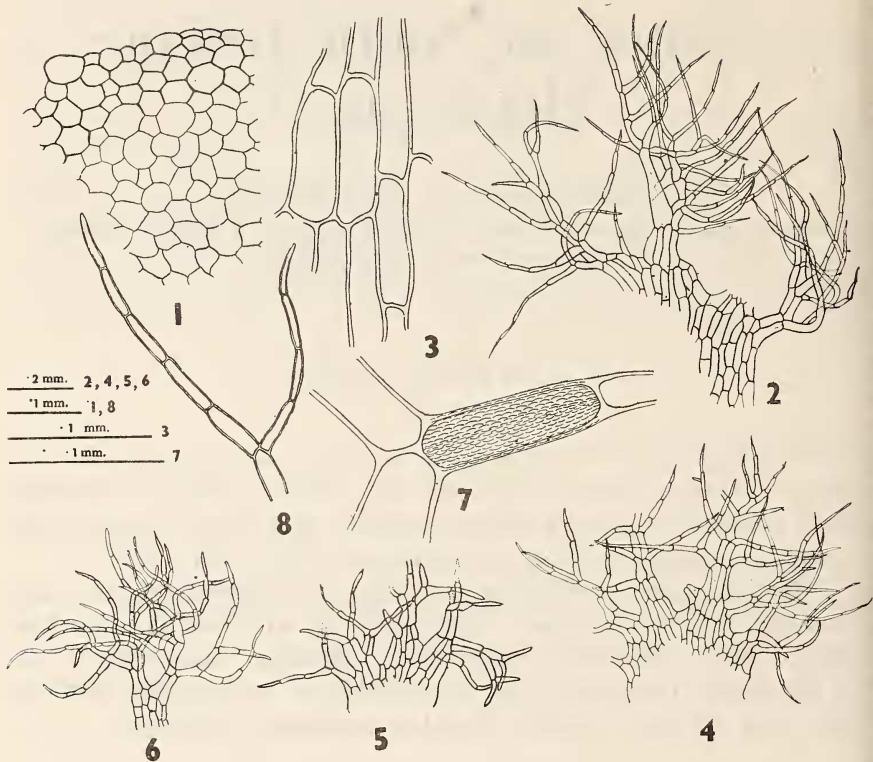
Trichocolea tomentella Dumort., Rec. d'Observ. Jungerm. 20. (1835).

Trichocolea biddlecomiae. Austin, Bot. Gaz. 3:6. (1878).

Plant whitish green becoming yellowish on drying; stem about 10 cm or more in length, regularly bi-tri-pinnate, dorsally covered with paraphyllia (in the form of simple or branched filamentous cilia), 23-30

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* Synonymus adopted from Hatcher (1957).



Trichocolea tomentella

Fig. 1. Cross section of stem (a portion magnified); Fig. 2. Leaf of the main axis; Fig. 3. Cells of the leaf lamina; Fig. 4. Underleaf of the main axis. Fig. 5. Leaf of a branch; Fig. 6. Underleaf of a branch; Fig. 7. Cells of the cilia magnified; Fig. 8. Branched paraphyllium.

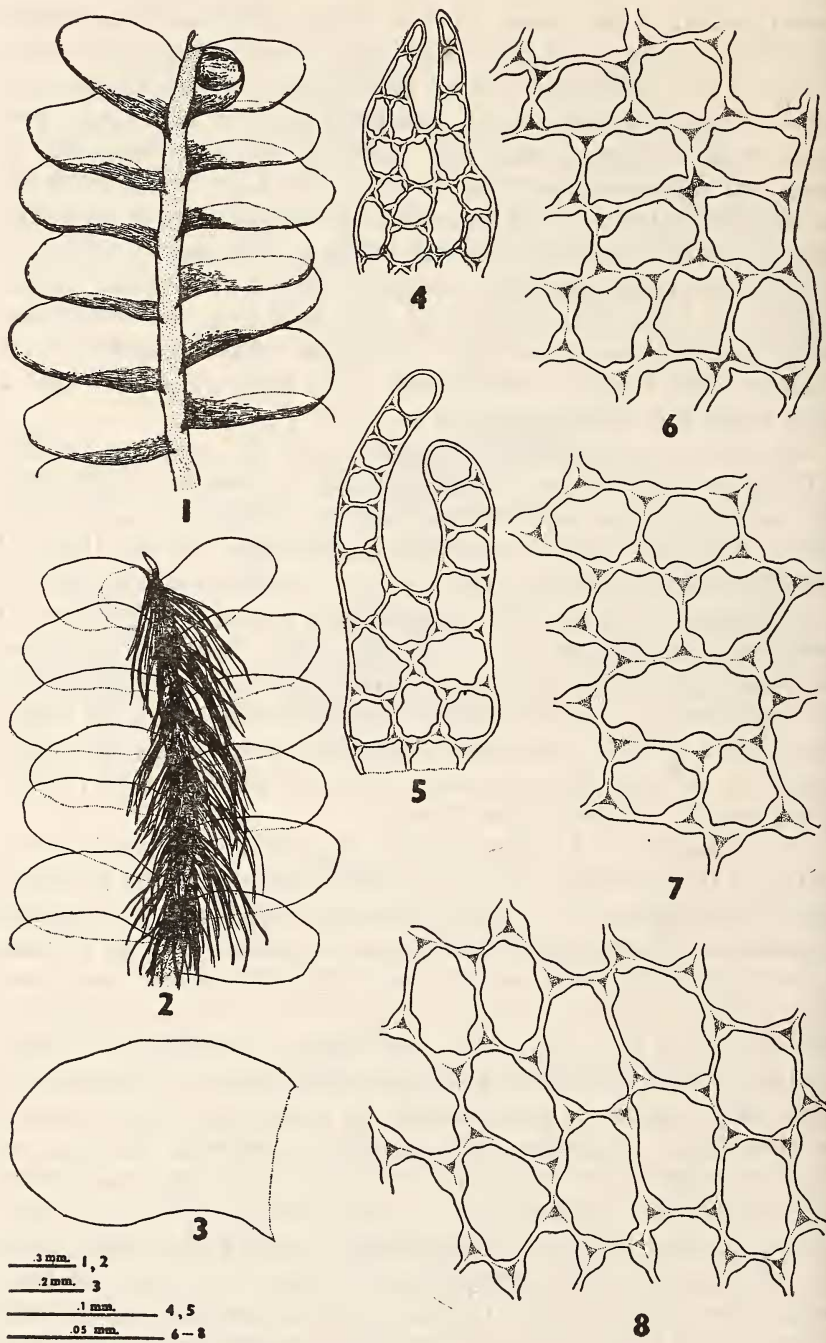
cells across diameter, cells differentiated into cortex and medulla, cortical cells 9.6-38.4 μ in diameter, with slightly thickened walls, medullary cells not thickened, 24-52.8 μ in diameter. Leaves in three rows, two lateral and one ventral, lateral leaves alternate, about 1.5 mm or less long, (from the base to the apex of the cilia), 1.7 mm broad, deeply divided into 6-8 (usually 6) segments with simple or branched cilia, cells of the cilia 57.6-105.6 μ long, 9.6-24.0 μ broad, cuticle striolate-papillose; cells of the undivided lamina 67.2-124.8 μ long, 19.2-28.8 μ broad; underleaves smaller than the leaves, c. 1 mm long, 1.5 mm broad, bifid, each lobe further divided into 4-6 simple or branched cilia similar to those of the leaves. Male inflorescence branched, antheridial branches similar to that of the vegetative branches; bracts concave,

similar to that of the leaves, occur in series; antheridia large, stalked and globose, solitary or in pairs in the axils of bracts; bracteoles similar to that of the underleaves. Female inflorescence terminal on the main stem or branch, perianth absent, archegonia clustered at the apex protected by three series of bracts and bracteoles, the inner most series of bracts and bracteoles larger than the rest of the outer series; bracts apparently similar to that of the leaves and bracteoles to that of the ventral row of leaves. Sporophyte enclosed within a club shaped coelocaul (shoot calyptra), capsule large, oblong, dehisces in to 4 valves; capsule wall 6-7 cell layers thick, cells of the outer layer large and thin-walled, cells of the inner layer small with rod shaped thickening bands on the tangential wall. Elaters reddish-brown 117 μ long, 10 μ wide with 2 spiral bands and rounded tapering ends.

The plants investigated in the present work were collected by Rev. I. Pfeleiderer (of Esslingen, Germany) from Kudremukh, south India. The study was further supplemented from fresh collections made by the authors from Palni Hills in south India in December-January, 1965 and from Darjeeling in eastern Himalayas in December-January 1969-70.

T. tomentella has a characteristic feathery appearance in nature. It grows on moist rocks in dense overlapping tufts either in pure formation or occasionally mixed with other hepatics and mosses. Unfortunately the specimens from south India and eastern Himalayas are not fertile. The account of male and female inflorescence given in the taxonomic description is based on contributions made by Hatcher (1957, 1959) on the genus *Trichocolea* from America.

The development of fruiting structure in *Trichocolea* is of three distinct types (Hatcher 1959). In *T. tomentella* "fertilization and the beginning of development of the young sporophyte apparently stimulate the formation of a broad meristematic zone of stem tissue between the base of the fertile archegonium and the point of insertion of the inner most series of bracts." After fertilization of one of the archegonia which are clustered at the apex, the young developing sporophyte grows downward into the stem tissue and gets differentiated into an haustorial foot, a seta and a capsule. In the meantime the stem tissue which surrounds the developing sporophyte, grows upwards completely enclosing the young sporophyte. This covering of the thick-walled stem tissue which surrounds the sporophyte was termed coelocaul (Goebel 1930; Knapp 1930). The outer surface of the coelocaul is stated to be densely clothed with paraphyllia. The coelocaul is surrounded by bracts and bracteoles below, while at the top of the coelocaul numerous unfertilized archegonia are found. On maturation of the sporophyte, seta elongates and the tip of the coelocaul ruptures irregularly by the emergence of the large, oblong capsule. The spores in this genus are reddish-brown, 30-35 μ in diameter, oval to rounded, smooth or minutely punctate.



Notoscyphus lutescens

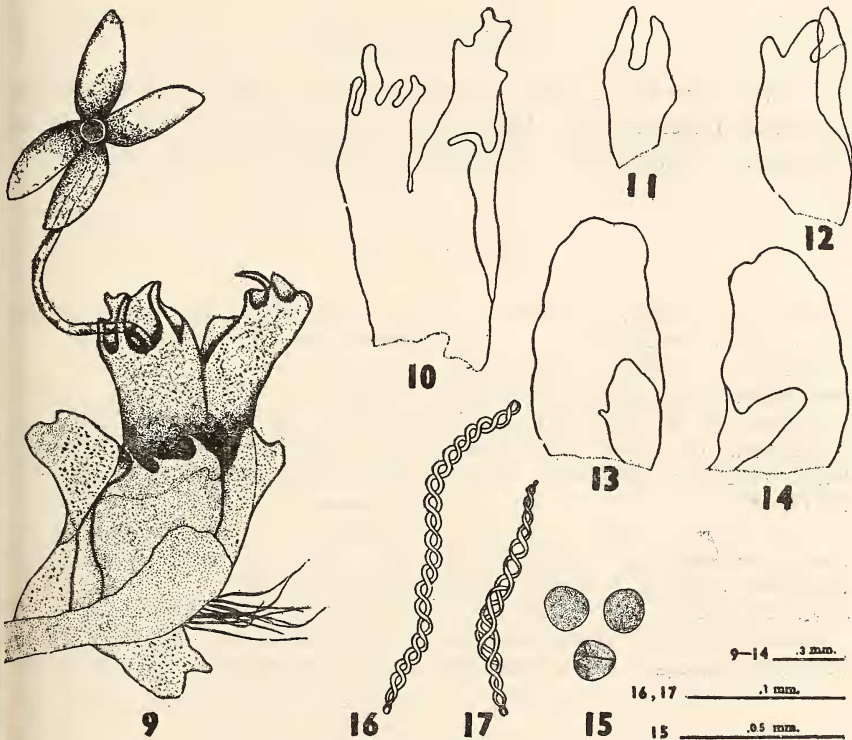
Figs. 1-2. Dorsal and ventral view of the plant respectively; Fig. 3. Leaf; Figs. 4-5. Underleaves (amphigastria); Figs. 6-8. Marginal, middle and basal cells of the leaf respectively.

2. *Notoscyphus lutescens* (L. et L.) Mitt. Fl. Viti, p. 407, 1862. (Figs. 1-17).

**Jungermannia lutescens* L. et L., Pug. IV p. 16 (1932).

Gymnomitrium lutescens G., Syn. Hep. 4 (1844).

Plants small 10-18 mm or so long, prostrate, green to yellowish-green, rarely branched; rhizoids ventral, arising in fascicles from the base of the amphigastria. Leaves in three rows, two lateral and one ventral; lateral leaves simple, succubous, entire, unistratose, cells with conspicuously bulging trigones, oil bodies in fresh leaves 2-4 per cell, elliptical, prominently granular with rough outline, apical cells of the leaf $19.2-28.8 \times 38.4-48.0 \mu$, middle cells $19.2-28.8 \times 24.0-57.6 \mu$ and basal cells $24.0-38.4 \times 28.8-48.0 (52.8) \mu$; underleaves minute, bifid, *c.* 264.0μ long, 100.8μ broad, cells with conspicuously developed trigones. Dioecious. Antheridia in the axils of the bracts, bracts sac like in two



Notoscyphus lutescens

Fig. 9. Magnified view of the perianth with elongated seta and dehisced capsule; Fig. 10. A portion of the perianth; Figs. 11-12. Female bracts; Figs. 13-14. Male bracts; Fig. 15. Spores; Figs. 16-17. Elaters.

* Synonyms adopted from Arnell (1963).

alternate rows enclosing a single antheridium in each. Archegonia apical, enclosed within the perianth, bracts and bracteoles bifid, sporophyte differentiated into foot, seta and capsule, seta elongated bearing a spherical dark-brown capsule, capsule dehiscence into 4-valves, capsule wall multi-stratose, cells with thickening bands; spores unicellular, more or less spherical c. 12.0-14.4 μ in diameter; elaters tapering at both ends, usually bispirate, rarely with a tendency to become trispirate, 67.2-249.6 μ long and 9.6-14.4 μ broad in the middle.

The plants were collected by us from Kodaikanal (alt. 6500 ft, Palmi Hills), south India in December-January 1965-1966. This species also grows abundantly in east Himalayan territory. The study of the oil-bodies was completed from the specimens collected from Darjeeling during December-January 1969-70 (Udar *et al.* 1970).

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